Attachment A
List of LWG Major Technical Issues Related to the Portland Harbor Feasibility Study

1) Incomplete evaluation of the alternatives and their effectiveness. The 2015 draft FS does not present technically supportable analyses to make a meaningful comparison among the set of alternatives. The individual and comparative analysis of alternatives in the 2015 draft FS is almost entirely qualitative, and most of the results and conclusions on the evaluation of the alternatives using the NCP criteria are unsupported and highly subjective. The lack of meaningful and reproducible metrics results in a qualitative and highly subjective comparison of the effectiveness of and differentiation among the alternatives. In particular, the absence of quantitative analysis for the long-term effectiveness evaluation, such as estimates on future sediment concentrations after construction completion, obviates the required long-term effectiveness and protectiveness evaluations. There is no basis in EPA's 2015 draft FS to state that the smaller alternatives will not achieve the same risk reduction as the larger alternatives absent any estimate of sediment concentrations or other quantitative assessment.

   EPA's evaluation includes no attempt to quantify natural recovery. Although EPA acknowledges that natural recovery is occurring at Portland Harbor, EPA has discarded nearly all the empirical data and analyses presented in the Remedial Investigation Report, along with both the QEAFate model developed by the LWG for the 2012 draft FS. EPA's own efforts to quantify natural recovery using the SEDCAM model were dropped in favor of a qualitative estimate of the role of natural recovery in the long term effectiveness of the alternatives. This decision leaves EPA with only a one measure of performance for its alternatives: estimated sediment concentrations immediately following construction.

   We feel that EPA's decision to abandon its efforts to quantify natural recovery is counter to the EPA Sediment Guidance which counsels:

   > "The time needed until protection is achieved can be difficult to assess at sediment sites, especially where bioaccumulative contaminants are present. Generally, for sites where risk is due to contaminants in the food chain, time to achieve protection can be estimated using models. These models may have significant uncertainty, but may be useful for predicting whether or not there are significant differences between times to achieve protection using different alternatives. When comparing time to achieve protection from MNR to that for active remedies such as capping and dredging, it is generally important to include the time for design and implementation of the active remedies in the analysis."[1]

   EPA's decision to abandon efforts to quantify natural recovery undermines the validity of the detailed analysis of alternatives in the FS:

   - EPA is left with no real measure to demonstrate that the threshold criterion of protectiveness is met by any of its alternatives. EPA's "Summary of Comparative

[1] *Contaminated Sediment Remediation Guidance for Hazardous Waste Sites.* EPA Office of Solid Waste and Emergency Response. §2.4.1 OSWER 9355.0-85. December 2005.

Analysis of Alternatives" (Table 4.3-1), for example, states, for every alternative, "Time to achieve protectiveness through MNR is uncertain."

- EPA is unable to compare the time to achieve RAOs and other short- and long-term effectiveness criteria in any more than the most general terms (For Alternative F, the "estimated time to achieve RAOs is uncertain, but less than for E"). These conclusions are not supported by the Conceptual Site Model as detailed in the attached Comment 13.

- The lack of any quantitative analysis of natural recovery precludes any meaningful evaluation of the cost effectiveness of the alternatives. For example, will the $1.5 billion cost differential between Alternatives G and B get us to protectiveness 10 years sooner, 1 year sooner or ever?

2) EPA's set of alternatives are not implementable as described in the FS. The FS fails to adequately consider critical implementation issues that will substantially increase the time, difficulty, and cost of conducting the cleanup. Many of EPA's assumptions about production times, volumes and costs are inconsistent with experience at other sediment sites and do not appear to be physically possible in practice at Portland Harbor. To take just one example, EPA's production calculations assume that dredging will proceed 24 hours per day, 6 days per week, during the entire four month in-water work window each year, for many years on end. EPA's assumptions do not include any estimate of dredging efficiency (as was used in the Duwamish FS), including time necessary to reposition the dredge along its dredging lane, move barges receiving the dredged materials in and out of the work area, install and maintain water quality controls or perform water quality monitoring. EPA also briefly mentions but quickly dismisses the very probable objection of the community in nearby residential neighborhoods to light and noise pollution associated with long term 24 hour construction work. For these and other reasons, EPA's production assumptions are demonstrably incapable of attainment in the real world, and result in a skewed comparison of alternatives re short- and long-term effectiveness and implementability.

   The unrealistically optimistic production rates lead to significant underestimation of both construction time frames and potential remedy costs. Overly optimistic estimates about the time to complete construction undermine EPA's assessment of the long- and short-term effectiveness of each alternative (longer time required to reach RAOs, longer short term risk due to higher fish tissue concentrations during construction, more quality of life disruption to the community, etc.) and compound in a way that could significantly change the conclusions about the benefits of more aggressive approaches (if EPA's production rates are off by a factor of 2, Alternative B would take 8 years, rather than 4 years to complete, whereas Alternative G would be in construction for 36 years rather than 18). Similarly, underestimation of likely actual remedy costs precludes meaningful comparison of the cost effectiveness of EPA's alternatives, as required by the NCP. As discussed above, this problem is compounded by the lack of any metric to consider the effects of natural recovery before, during, or following construction.

   The extremely high costs for the five alternatives (ranging from $1 billion to $4 billion in current dollars) are not proportional to the overall effectiveness of these alternatives, and the alternatives are impracticable to implement. In comparison, the LWG identified a set of

alternatives that achieved substantial and similar risk reduction, were implementable, and cost-proportional to the alternatives' overall effectiveness. In the LWG's draft FS, the greatest degree of overall effectiveness was achieved by alternatives that ranged in cost from $169 to $398 million.

3) Significant divergence from how EPA has handled similar issues at other sediment sites. EPA prematurely and prescriptively applies a number of requirements increasing the cleanup costs by hundreds of millions of dollars while achieving no real risk reduction benefit at the Site. EPA's application of extremely low and unprecedented thresholds to identify "principal threat waste" means large quantities of material that EPA acknowledges can be reliably controlled through capping will be subject to costly in situ treatment that provides no actual additional risk reduction. Other "principal threat" materials removed from sediments or riverbanks must be treated prior to disposal in a permitted landfill, although EPA undertakes no analysis of whether treatment prior to landfilling has any risk benefit. Similarly, EPA's FS seems to indicate that dredged or excavated materials that are not hazardous wastes must nonetheless meet hazardous waste land disposal restrictions – and not merely the land disposal restrictions applicable to remediation waste, but those applicable to as-generated industrial hazardous wastes (most of which are, again, well below DEQ risk-based cleanup standards for soil). The significant burdens EPA's FS places on the management of remediation wastes have the potential to increase costs by hundreds of millions of dollars without any associated risk reduction.

   Prescriptive assignment of treatment technologies across all alternatives is inconsistent with the NCP requirement to develop a range of alternatives requiring different degrees of treatment for source materials. 40 CFR 300.430(3)(i). It results in more aggressive remedial alternatives scoring higher for "reduction of toxicity" because of "treatment" without any quantitative or even qualitative evaluation of whether the reduction in toxicity is achieved by the treatment technology or simply by preventing exposure. Requiring unnecessary treatment of risks already controlled through capping or removal and offsite disposal certainly increases cost, but the absence of any alternatives that include less treatment preclude any evaluation of the cost effectiveness of treating these materials.

   One real point of comparison is the McCormick & Baxter NPL site, the in-water portion of which is within the Portland Harbor site. EPA has concluded that the existing sediment cap at McCormick & Baxter "is protective of human health and the environment because the remedy required by the ROD has been implemented, and is working as intended."[2] The in-water remedy at the McCormick & Baxter site cost $12 million.[3] If the approach from EPA's FS were applied to McCormick & Baxter, construction costs would range between $445 million and $520 million[4], largely because the contamination at McCormick & Baxter would qualify as "principal threat waste" per EPA's unprecedented definition of that concept.

4) Incorrect application of risk assessment results and absence of risk management. EPA's FS uses exposure areas that are different from those used in the risk assessments and focuses

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[2] *Third Five-Year Review Report, McCormick & Baxter Creosoting Company Superfund Site* (EPA and DEQ, September 2011)

[3] *Preliminary Close Out Report, McCormick & Baxter Creosoting Company Superfund Site* (EPA, September 2005)

[4] Using EPA's methods as best we can reproduce them, this includes a contingency range from 20% to 40%, presented in 2015 current dollars, and not including long term operations, maintenance, and monitoring costs.

on reducing chemical concentrations rather than on managing the most important risks at the site. In addition, EPA's alternatives are evaluated solely against the highest risk estimates and most conservative risk scenarios identified in the baseline risk assessments in the absence of any application of risk management principles, and in ways that are themselves inconsistent with the risk assessments. The effectiveness of the alternatives at cleaning up PCBs, for example, is evaluated based upon a far more conservative assumption (1 river mile exposure area split longitudinally into three parts) than was used in the Baseline Human Health Risk Assessment (one whole river mile for smallmouth bass fish consumption). EPA's alternatives require large areas of total PAH cleanup, despite the fact that carcinogenic PAHs represent less than 1% of the cumulative risks to people who eat fish, and EPA has no technical basis to expect that cleaning up large areas of PAHs would have any meaningful impact (i.e., reduction) on overall fish consumption risk. Although EPA's approved Baseline Ecological Risk Assessment defined areas of benthic risk specific to the Site through a nuanced comprehensive benthic risk area approach that considered multiple lines of evidence, the FS completely abandons the comprehensive benthic approach in favor of generic screening level values, and then demerits all of its alternatives because they do not comprehensively address benthic risk.

EPA's decision to focus so intensely on contaminant mass reduction means that the FS includes no tools for EPA and other stakeholders to evaluate the magnitude of meaningful risk reduction achieved by the various alternatives against other important considerations. EPA's FS does not include information necessary for EPA to compare, rank, and prioritize risk and compare the cost effectiveness of cleanup options to reduce that risk.

5) Prescriptive technology assignments. EPA uses a prescriptive set of technology evaluation and scoring criteria to determine the technologies to be applied in each area of the Site. By assigning one technology to the same sediment areas in the technology screening step, the technology assignment prevents meaningful comparison of the performance of technologies and limits the evaluation of multiple technologies performing equally effectively. And because the technology assignment is based on an FS level of information, the prescriptive set of evaluation criteria will not appropriately or accurately predict the most appropriate technology assignments or configurations for Remedial Design (RD). Finally, this prescriptive approach does not accommodate flexibility for RD when additional information and analysis will be conducted.

These examples illustrate that simply modifying or correcting a few assumptions and calculations will not shore up the alternatives development and evaluation in EPA's FS. As a result, the LWG is concerned that EPA's FS does not currently present alternatives that are likely to be implemented by potentially responsible parties through settlement.